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ABSTRACT

The effects of instructional guides and wait-time feedback upon the classroom interaction of 40 middle school science teachers were investigated in a prior study. The experimental nature of that study produced an artificial situation involving little personal contact between teacher-participants and the research staff. Therefore, a subsample of 10 teachers cooperated in a follow-up study. After a workshop, weekly tape recordings of the participants' classes were analyzed. Discussions with the teachers were held concerning effectiveness. Since only strengths and successes were emphasized, the process was labeled "supportive intervention." Over the 4-week duration of the study, important changes in teacher-student interaction were observed. Teachers extended their wait-times to the 3 second minimum. There was an increase in student-student interaction and in length of student responses. Teachers asked greater numbers of divergent and evaluative types of questions indicative of higher levels of cognitive discourse in the classroom. Finally, the teachers responded in a highly favorable manner to the suggestions provided by members of the research team. It appears that monitoring wait-time using an electronic device accompanied by supportive intervention does provide an avenue for the improvement of teaching skills. (JN)

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OBSERVED CHANGES IN CLASSROOM BEHAVIOR UTILIZING SUPPORTIVE INTERVENTION

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Observed Changes in Classroom Behavior Utilizing Supportive Intervention

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The recently reported study by Swift and Gooding (1983) investigated the effects of instructional guides and wait time feedback on the classroom interaction of 40 middle school science teachers. Whereas a comparison group made essentially no changes in their teaching behavior during the semester, teachers that used the wait time feedback devices extended their pause durations significantly. The increase in wait times was accompanied by a number of desirable changes that occurred spontaneously. These changes included:

1. more frequent use of evaluative questions,
2. more frequent contributions of volunteered information relevant to discussions,
3. longer answers to questions,
4. a lower percentage of teacher talk, and
5. more student words relevant to the discussion.

The study by Swift and Gooding was conducted in such a manner as to minimize contact between the research team and the participating teachers. For example, tape recordings of class discussions were collected each week by a staff member not involved in data analysis. This and other steps were taken to insure that any observed changes were due only to the variables of immediate feedback and guides, and not to interaction with

the investigators. These conditions, necessary for the experimental study, were deemed by the investigators to be an artificial situation. For example, one group of participants in the study used the feedback devices with no rationale, except that the investigators thought that wait time was a factor of interest.

Analysis of the tape recordings later revealed a number of surprises to the research team. These included a lack of effective discussions, as indicated by long lectures and oral drill exercises, and a lack of observance of wait time 2 (teacher wait time) by the teacher-participants. To remedy these concerns a supportive inservice teacher education program was designed. The new program entailed a workshop, weekly tape recordings of the participants' classes, analysis of the recordings, and sessions with the teachers concerning their effectiveness.

Procedure

From the 40 teachers in the original study, 12 teachers were contacted and asked to participate in a follow-up study. Eleven agreed; the first 10 were accepted. Of these, three were in the comparison group of the original study, one had used the instructional guides, and six had used the wait time feedback devices.

In the first phase, the teachers participated in a two-and one-half hour workshop in which a transcript containing short wait times was reenacted and contrasted with one with longer

wait times. From the reenactments and other data, the teachers reached the conclusion that waiting three seconds between student and teacher interaction produced higher cognitive level of discourse. They also concluded that students gave longer relevant answers and had increased opportunities to engage in dialogue with teachers and classmates. Furthermore, evidence was provided to the teachers showing that increasing their wait times following questions and answers produced no difference with respect to discipline in the classroom, a point about whic they had expressed concern. Several specific strategies for engendering true discussions were presented. Finally, each teacher was provided with an electronic device which would supply an immediate indication of successful pausing to a three second criterion following questions and answers. This time length was based on research conducted by Rowe (1974a, 1974b) which indicated that a three second pause was the minimum to permit adequate thinking time for both teachers and students.

A term that is not commonly used best describes the next phase of the project. **Supportive intervention** was defined as a procedure in which strengths were emphasized during evaluations of tape recorded lessons. Because of the danger of hurting the feelings of the teacher-participants with casual remarks, the study team listened to the recordings without the presence of the teachers. Notes were taken which, when synthesized, emphasized teaching successes. Suggestions for further professional growth were made. Behavior that was negative or

contradictory (e.g. shorter wait time, or increased numbers of low level memory questions in discussion) was ignored. The term "criticism" was carefully avoided.

The duration of the follow-up study was limited to four weeks, whereas the previous project had extended throughout a full academic semester.

The recordings were collected on each Friday and analyzed during the weekend. Reinforcement was given for successful approximations of three second wait times, operation at higher cognitive levels of thinking, and utilization of student interaction. Consultation with individuals during planning time on each Monday provided opportunities for supportive intervention and discussion of teaching successes. This procedure, summarized in Figure 1, can be repeated as often as

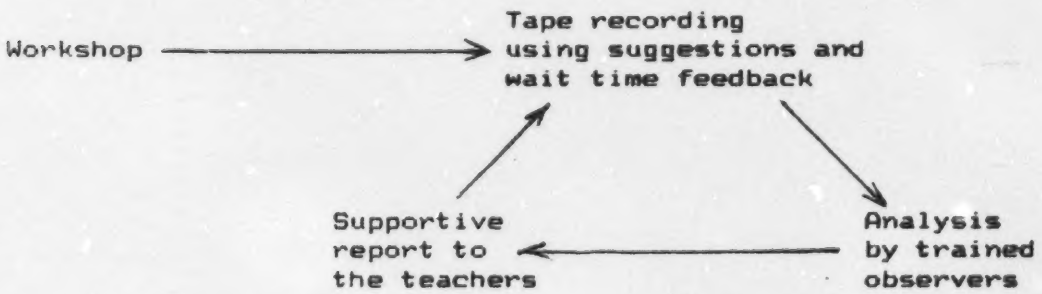
Workshop
Tape recording using suggestions and wait time feedback
Analysis by trained observers
Supportive report to the teachers

Figure 1. The supportive intervention process. The participants can become the trained observers in this model.

deemed necessary by the participants. Three supportive sessions were provided in this study.

Results

Previously, the effectiveness of the wait time feedback device in increasing pauses in classroom discussion had been demonstrated in the semester-long investigation (Swift & Gooding, 1983). These changes are reflected in Table 1 ("Major Study"), but they are diminished in that table because the data includes that of 4 teachers who did not receive wait time feedback as well as the 6 that did receive wait time information. When encouraged by supportive intervention, the magnitude of the changes was enhanced. As shown in Table 1, the mean wait times improved to values close to the three second criterion. In addition, the percentage of time that students were talking about topics relevant to the lessons nearly doubled and the mean length of student statements (answers to questions, discussion comments, or questions) increased by nearly 50 percent. The fourth item in the table is especially important. With wait time feedback only, the percentage of higher level questions spontaneously increased, but still remained at quite a low level. However, when wait time feedback was supplemented by supportive intervention, the percentage of higher level questions increased to a very favorable 37 percent. Data collected by S. T. Doerr (personal communication, April, 1984) indicated that the Piagetian levels of the classes also changed drastically with supportive intervention. The level was elevated toward formal operations by 0.5 to 1.0 units on a 6 point scale (see Table 2).

All of the teachers in the sample expressed a high degree of satisfaction with the way supportive intervention was given. The teachers improved their skills while maintaining positive self-images. Throughout the intervention period, they exhibited enthusiasm toward professional growth and, at the conclusion, stated that they would miss having the valuable input which had been provided by the analysis team.

In sum, the authors have determined that effective use of wait time can result in spontaneous improvements in both cognitive and affective variables in the classroom. These changes are enhanced if information concerning wait time durations is supplemented by supportive intervention from persons who have carefully listened to tape recordings of classroom interaction. In an era of low teacher turnover and an aging teacher population, methods that effectively improve the skills of inservice teachers are of vital importance. It appears that monitoring wait times using an electronic device accompanied by skilled analysis of tape recordings and supportive intervention does indeed provide an avenue to the improvement of teaching skills.

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Table 1

Changes in Selected Variables with Supportive Intervention

Behavior*	Base-line Data	Major Study	With Supportive Intervention	F Ratio	p
WT1	1.105	2.115	3.215	10.724	.0001
WT2	0.574	1.002	2.450	23.828	.0000
PST	17.289	17.796	30.265	12.232	.0050
PHQ	8.001	15.352	37.467	12.267	.0005
MLSI	4.950	5.154	7.227	5.055	.0030
Discip	0.107	0.986	0.066	4.696	.0112
Derog	0.000	0.473	0.000	5.663	.0046
HPL	3.778	3.471	4.235	5.317	.0090
GPL	2.000	2.158	2.813	10.242	.0002

*WT1 = Wait time 1 mean (seconds)
WT2 = Wait time 2 mean (seconds)
PST = Percentage of talk by students
PHQ = Percentage of higher level questions
MLSI = Mean length of student interaction (words)
Discip = Frequency of disciplinary comments
Derog = Frequency of derogatory comments
HPL = Highest Piagetian level question
GPL = General Piagetian level

SUPPORTIVE INTERVENTION STUDY

		WT 1	WT 2	PST	PhQ	MLSI	DISC	DEROG	HPL	GPL
Pre	Week 2	1.105	0.574	17.29	8.00	4.950	0.107	0.000	3.778	2.000
/	Week 4	2.406	1.149	20.56	11.00	6.736	0.938	0.655	3.444	2.222
/	Week 5	2.331	1.858	18.66	13.74	5.910	0.875	0.564		
Major	Week 8	1.945	0.844	18.07	17.36	5.529	0.652	0.208	3.500	2.100
Study	Week 11	1.824	0.783	13.08	22.00	4.281	0.285	0.487		
\	Week 13	2.305	0.773	15.96	16.98	4.773	0.996	0.382		
\	Week 15	1.849	0.558	20.73	10.67	3.531	2.304	0.552		
/	Week A	2.964	2.012	30.22	23.12	6.709	0.111	0.000		
Support.	Week B	3.142	2.757	33.05	41.52	8.158	0.000	0.000	4.250	2.625
Interv.	Week C	3.391	2.542	28.58	39.77	6.433	0.144	0.000		
\	Week D	3.361	2.488	29.76	44.84	7.742	0.000	0.000	4.222	3.000